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Portable electronic nose applied to determination of contaminants in milk

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Milk is one of the most consumed foods in the world and one of the most likely to suffer adulteration by adding water or even chemical substances which represents a serious risk to consumer health, due to this the development of more effective tools for the analysis of milk has been the subject of constant studies. Among the characteristics of milk, the aroma is one of the most important and can say much about the quality of the product. The electronic nose has demonstrated to be a promising tool for the analysis of flavorings and similar to human olfaction, it uses an array of chemical sensors with partial selectivity associated with pattern recognition powerful techniques, among them the artificial neural networks have shown satisfactory performance and efficiency being the most used for discrimination of aromatic profiles. This paper presents the performance of a portable electronic nose designed for the quality evaluation of milk when it is subjected to adulteration by chemicals such as formaldehyde, sodium hydroxide and urea, the differential of this device compared to hallowed techniques of physicochemical analysis is the possibility of obtaining real-time response and adds portability, low cost and simple interface. For two months, we analyzed five commercial brands of milk and from these, samples were separated containing different proportions of the contaminants cited, altogether 40 samples were analyzed. For the recognition and classification of each contaminant, we use a neural network multilayer perceptron, in addition, other techniques facilitated the development of neural network such as the bootstrap resample used to create a network training data set from the original samples, network parameters were adjusted using sequential simplex optimization and the reliability of the results was analyzed through statistic tools. The neural network showed satisfactory performance recognizing all contaminants from the set of test samples constituted only by the original samples, samples used for training obtained from the bootstrap, 95% were correctly classified as 97% of validation samples and this demonstrates that the network is able to learn to identify the aromatic profile of each contaminant. The advantage observed by the incorporation of artificial neural networks to the electronic nose is the possibility to circumvent the effects of noisy signals and interferences which the electrical measurements are subject. This is the first time that the electronic nose is applied to discrimination milk when subjected to adulteration by various types of contaminants which makes it an innovative tool for the dairy industry.

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Organic free range breeding systems improve the ratio polyunsaturated fatty acids/saturated fatty acid in Fulani and Sahoue indigenous chicken meat of Benin

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The current study aims to determine the fatty acids profile of indigenous chicken meat of Benin (Fulani and Sahoue ecotypes) in relation with the breeding mode and the type of muscle. Two groups of 52 chickens of each ecotype were reared respectively under traditional and improved breeding systems until 28 weeks old and then slaughtered. Breast and thigh were used for fat extraction and fatty acids profile analysis. It appears that the predominant fatty acids were palmitic and stearic (18:0) acids as saturated fatty acid (SFA), oleic acid as monounsaturated fatty acid (MUFA) and linoleic acid (LA) and arachidonic acid as polyunsaturated fatty acid (PUFA). Palmitic acid, oleic acid and arachidonic acid were the most abundant. The highest SFA and PUFA concentrations were found respectively in Fulani and Sahoue ecotypes ($P<0.05$). The n-3 PUFA content was lower than n-6 PUFA in all ecotypes with the highest n-3 PUFA content (5.66%; $P<0.05$) found in Fulani chickens. The weakest ratio n-6/n-3 PUFA was also found in Fulani chickens. The fatty acid composition was also affected by production system and muscle type. The n-3 PUFA was abundant in free range (5.01%) than in confinement breeding system (4.82%). The ratio n-6/n-3 fatty acid was similar in both breeding systems ($P\Sigma 0.05$). The ratio PUFA/SFA was higher in meat from free range system than confinement system ($P<0.05$). The breast meat showed higher n-3 PUFA concentration and lower ratio n-6 PUFA /n-3 PUFA than thigh meat ($P<0.001$). Overall, the breast meat ensures additional health benefit for consumers than thigh meat. Furthermore, organic free range system increases omega-3 fatty acids concentration.

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